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**AQUATIC INVERTEBRATES AND HABITAT AT A FIXED
STATION ON THE FISHER RIVER,
LINCOLN COUNTY, MONTANA**

August 8, 2001

**A report to
the Montana Department of Environmental Quality
Helena, Montana**

by
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INTRODUCTION

This report is one of 38 brief interpretive summaries of data assembled as part of a statewide, multi-year study conducted by the Montana Department of Environmental Quality (MT DEQ). Each report discusses information generated from a single benthic invertebrate sample collection and habitat evaluation at a fixed station established on a gauged river or high-order tributary. The present treatise focuses on the aquatic community sampled on the Fisher River near Libby, Montana on August 8, 2001. The sample site was located by GPS reading at 48° 21' 24" N, 115° 18' 57" W, lying within the Northern Rockies Ecoregion (Woods et al. 1998). The sample was collected by personnel of MT DEQ. Sampling effort consisted of either a composite of four Hess samples, or a one-minute kicknet collection (Bukantis 1998). Habitat parameters were evaluated using the MT DEQ Macroinvertebrate Habitat Assessment Field Form for streams with riffle/run prevalence. Invertebrate samples were processed and animals identified by Rhithron Associates, Inc. Analysis of invertebrate assemblages was accomplished by applying the revised method (Bollman 1998) for streams of Western Montana's ecoregions. The method uses a multimetric battery to evaluate disturbance to biotic integrity.

The revised bioassessment metric battery and its scoring criteria have not been evaluated for application to higher-order streams and rivers; to date, no bioassessment method has been contrived for these waterways in Montana. Thus, the method used here is likely to have limitations in its applicability to the sites in this study. For example, 24 of the riverine or high-order waterways sampled for the fixed station study were located within Western Montana ecoregions and were sampled between July 23 and August 25, 2001. Mean water temperature for these sites at the time of sampling was 19.8°C (median = 19.4°). Temperatures ranged from 15.5°C (Kootenai River near Libby) to 25.3°C (Jefferson River near Three Forks). Ninety-eight sites from Western Montana were used to assemble the revised metric battery and to test it for sensitivity in detecting impairment, to establish scoring criteria, and to improve robustness of bioassessment. These 98 sites were mainly second and third order streams; the sampling season roughly corresponded to that of the fixed-station study. Mean water temperature for these sites at the time of sampling was 15°C (median = 14°C). Natural variations in benthic community composition and structure along longitudinal and thermal gradients are well known phenomena. Thus, scores and classifications were established for much smaller systems with significantly lower water temperatures; impairment classifications and use support designations in this study must be interpreted with care. Results from the application of other metric batteries may be found in the Appendix.

RESULTS AND DISCUSSION

Table 1 itemizes the nine evaluated habitat parameters and shows the assigned scores for each, as well as the integrated score and condition category.

Overall habitat conditions were optimal, but flow conditions were perceived to be marginal. Benthic substrate was judged sub-optimal, implying less particle size diversity than expected. The riparian zone was abbreviated on both sides of the channel, and was scored sub-optimal on the right bank, but only marginal on the left.

Table 1. Stream and riparian habitat assessment for a fixed station on the Fisher River near Libby. August 2001.

Max. possible score	Parameter	Fisher River near Libby
10	Riffle development	10
10	Benthic substrate	8
20	Embeddedness	16
20	Channel alteration	20
20	Sediment deposition	17
20	Channel flow status	8
20	Bank stability: left / right	9 / 9
20	Bank vegetation: left / right	9 / 9
20	Vegetated zone: left / right	5 / 8
160	Total	128
	Percent of maximum CONDITION*	80 OPTIMAL

*Condition categories: Optimal > 80% of maximum score; Sub-optimal 75 - 56%; Marginal 49 - 29%; Poor <23%.
Adapted from Plafkin et al. 1998.

Table 2. Metric values, scores, and bioassessment for a fixed station on the Fisher River near Libby. The revised bioassessment metric battery (Bollman 1998) was used for the evaluation. August 2001.

Fisher River near Libby		
METRICS	METRIC VALUES	METRIC SCORES
Ephemeroptera richness	7	3
Plecoptera richness	4	3
Trichoptera richness	7	3
Number of sensitive taxa	3	2
Percent filterers	32.1	0
Percent tolerant taxa	6.8	2
TOTAL SCORE (max.=18)		13
PERCENT OF MAX.		72
Impairment classification		SLIGHT
USE SUPPORT		PARTIAL

Bioassessment results are given in Table 2. When this bioassessment method is applied to these data, scores indicate that this site on the Fisher River is slightly impaired and only partially supports designated uses.

While the mayfly taxa richness (7) is as good as expected, suggesting no impairment of water quality, there is other evidence that such impairment may exist. The biotic index value (5.14) is higher than the average value (4.41) for riverine sites in Western Montana in this study. In addition, midges are abundant, comprising 53% of the organisms sampled. Taxa richness (40) is quite high, and midges contribute 13 taxa to

this number. These findings suggest that a mild nutrient influence may affect the benthic community at this site. Taxa richness is generally high when habitat and water quality are unimpaired. However, this measure may show a paradoxical increase when mild nutrient enrichment occurs in normally oligotrophic waters; this may be the case with the Fisher River.

Twenty "clinger" taxa were collected, as well as 7 caddisfly taxa, an indication that fine sediment deposition was not a limiting factor to biotic health. Ten predator taxa were present, suggesting that instream habitats were abundant and diverse. Functionally, the assemblage lacked the expected number of shredders, suggesting that riparian inputs of large organic material may have been limited, or that flow conditions were not conducive to its retention. Gatherers dominated the functional composition of the sample, a reflection of the overabundance of midges taken at the site.

CONCLUSIONS

- The elevated biotic index value, abundance of chironomids, skew of the functional composition, and high taxa richness suggest that mild nutrient pollution may affect the benthic assemblage at this site on the Fisher River.
- Components of the community suggest that instream habitats were essentially intact.
- The bioassessment method employed appears to have assigned an appropriate impairment category to this site, given the taxonomic composition and tolerance characteristics of the benthic assemblage.

LITERATURE CITED

Bollman, W. 1998. Improving Stream Bioassessment Methods for the Montana Valleys and Foothill Prairies Ecoregion. Master's (M.S.) Thesis. University of Montana. Missoula, Montana.

Bukantis, R. 1998. Rapid bioassessment macroinvertebrate protocols: Sampling and sample analysis SOP's. Working draft, April 22, 1997. Montana Department of Environmental Quality. Planning Prevention and Assistance Division. Helena, Montana.

Woods, A.J., Omernik, J. M. Nesser, J.A., Shelden, J., and Azevedo, S. H. 1999. Ecoregions of Montana. (Color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia. US Geological Survey.

APPENDIX

Taxonomic data and summaries

Fisher River

August 2001

Aquatic Invertebrate Taxonomic Data

Site Name: Fisher River near Libby

Site ID: K02FISHR01

Date: 8/08/01

Approx. percent of sample used: 40

TAXON	QUANTITY	PERCENT	HBI	FFG
<i>Dugesia</i> sp.	2	0.59	4	PR
Nematoda	2	0.59	11	PA
<i>Nais</i> sp.	25	7.35	8	CG
Total Misc. Taxa	29	8.53		
<i>Acentrella insignicans</i>	5	1.47	4	CG
<i>Baetis tricaudatus</i>	1	0.29	4	CG
<i>Drunella doddsi</i>	3	0.88	1	CG
<i>Drunella spinifera</i>	10	2.94	0	PR
<i>Serratella tibialis</i>	6	1.76	2	CG
<i>Epeorus longimanus</i>	1	0.29	1	CG
<i>Nixe</i> sp.	3	0.88	4	SC
Total Ephemeroptera	29	8.53		
<i>Suwallia</i> sp.	1	0.29	0	PR
<i>Calineuria californica</i>	1	0.29	2	PR
<i>Claassenia sabulosa</i>	2	0.59	3	PR
<i>Doroneuria</i> sp.	1	0.29	0	PR
Total Plecoptera	5	1.47		
<i>Brachycentrus americanus</i>	7	2.06	1	CF
<i>Brachycentrus occidentalis</i>	3	0.88	2	CF
<i>Culoptila</i> sp.	8	2.35	1	SC
<i>Hydropsyche</i> sp.	21	6.18	5	CF
<i>Lepidostoma</i> sp.-sand case larvae	3	0.88	1	SH
<i>Wormaldia</i> sp.	6	1.76	0	CF
<i>Rhyacophila Angelita</i> Gr.	1	0.29	0	PR
Total Trichoptera	49	14.41		
<i>Cleptelmis</i> sp.	1	0.29	4	CG
<i>Optioservus</i> sp.	12	3.53	5	SC
<i>Zautzevia</i> sp.	9	2.65	5	CG
Total Coleoptera	22	6.47		
<i>Chelifera</i> sp.	3	0.88	5	PR
<i>Simulium</i> sp.	6	1.76	5	CF
<i>Hexatoma</i> sp.	17	5.00	2	PR
Total Diptera	26	7.65		
<i>Cricotopus Bicinctus</i> Gr.	71	20.88	7	CG
<i>Cricotopus (Isocladus)</i> Gr.	21	6.18	7	CG
<i>Eukiefferiella Gracei</i> Gr.	1	0.29	8	CG
<i>Microtendipes</i> sp.	1	0.29	6	CF
<i>Orthocladius</i> sp.	4	1.18	6	CG
<i>Pagastia</i> sp.	5	1.47	1	CG
<i>Polypedilum</i> sp.	3	0.88	6	SH
<i>Rheocricotopus</i> sp.	2	0.59	4	CG
<i>Rheotanytarsus</i> sp.	2	0.59	6	CF
<i>Tanytarsus</i> sp.	63	18.53	6	CF
<i>Thienemanniella</i> sp.	1	0.29	6	CG
<i>Thienemannimyia</i> Gr.	2	0.59	5	PR
<i>Tvetenia</i> sp.	4	1.18	5	CG
Total Chironomidae	180	52.94		
Grand Total	340	100.00		

Aquatic Invertebrate Summary

Site Name: Fisher River near Libby

Date: 8/08/01

SAMPLE TOTAL

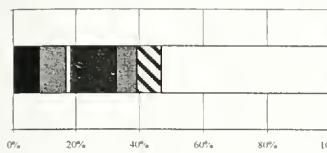
340

EPT abundance
TAXA RICHNESS
Number EPT taxa
Percent EPT

83
40
18
24.41

TAXONOMIC COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Misc Taxa	8.53	3	29
Odonata	0.00	0	0
Ephemeroptera	8.53	7	29
Plecoptera	1.47	4	5
Hemiptera	0.00	0	0
Megaloptera	0.00	0	0
Trichoptera	14.41	7	49
Lepidoptera	0.00	0	0
Coleoptera	6.47	3	22
Diptera	7.65	3	26
Chironomidae	52.94	13	180



FUNCTIONAL COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Predator	11.76	10	40
Parasite	0.59	1	2
Gatherer	47.06	16	160
Filterer	32.06	8	109
Herbivore	0.00	0	0
Piercer	0.00	0	0
Scraper	6.76	3	23
Shredder	1.76	2	6
Xylophage	0.00	0	0
Omnivore	0.00	0	0
Unknown	0.00	0	0



COMMUNITY TOLERANCES

Sediment tolerant taxa	1
Percent sediment tolerant	5.00
Sediment sensitive taxa	1
Percent sediment sensitive	1.76
Metals tolerance index (McGuire)	3.67
Cold stenotherm taxa	3
Percent cold stenotherms	4.12

Site ID: K02FIS11R01

DOMINANCE

TAXON	ABUNDANCE	PERCENT
<i>Cricotopus bicinctus</i> Gr	71	20.88
<i>Tanymarsus</i> sp	63	18.53
<i>Nais</i> sp	25	7.35
<i>Hydropsyche</i> sp	21	6.18
<i>Cricotopus (Isocladus) Gr</i>	21	6.18
SUBTOTAL 5 DOMINANTS	201	59.12
<i>Hexatoma</i> sp	17	5.00
<i>Optioservus</i> sp	12	3.53
<i>Dromella spinifera</i>	10	2.94
<i>Zarzava</i> sp	9	2.65
<i>Culicula</i> sp	8	2.35
TOTAL DOMINANTS	257	75.59

SAPROXYLICITY

Hilsenhoff Biotic Index

5.14

DIVERSITY

Shannon H (log_e)

2.86

Shannon H (log₂)

4.12

SIMPSON D

0.10

VOLTINISM

TYPE	ABUNDANCE	PERCENT
Multivoltine	149	43.75
Univoltine	155	45.51
Semivoltine	37	10.74

TAXA CHARACTERS

#TAXA	ABUNDANCE	PERCENT
Tolerant	4	23
Intolerant	3	14
Clinger	20	75.29

BIOASSESSMENT INDICES

B-IBI (Karr et al.)

METRIC	VALUE	SCORE
Taxa richness	40	3
E richness	7	3
P richness	4	3
T richness	7	3
Long-lived	8	5
Sensitive richness	3	3
%tolerant	6.76	5
%predators	11.76	3
Clinger richness	20	3
%dominance (3)	46.76	5
TOTAL SCORE	36	72 %

MONTANA DEQ METRICS (Bukants 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	40	3	3	3
EPT richness	18	3	3	2
Biotic Index	5.14	2	1	0
%Dominant taxon	20.88	3	3	3
%Collectors	79.12	2	1	1
%EPT	24.41	1	0	0
Shannon Diversity	4.12	3		
%Scrapers + Shredder	8.53	1	0	0
Predator taxa	10	3		
%Multivoltine	43.75	2		
%H of T	43		3	
TOTAL SCORES		23	14	9
PERCENT OF MAXIMUM		76.67	58.33	42.86
IMP AIRMENT CLASS		SLIGHT	SLIGHT	MODERATE

Montana DEQ metric batteries



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